REMARKS

Claims 1 and 3 have been amended to clarify the meaning of conjugate as used in the claims.

Figs. 3 and 4 have been amended to insert dimensions referred to in the specification at paragraphs [0019] and [0028].

The examiner has rejected claims 1 to 4 under 35 U.S.C § 103(a) as being unpatentable over Gerchberg U.S. Patent No. 6,369,932 in view of Hasegawa et al. U.S. Patent No. 4,935,625.

Reconsideration is respectfully requested.

Applicants' invention is directed to a phase contrast transmission electron microscope. Gerchberg, the principal reference, is directed to a method of producing a "synthetic" or computer generated "wave front image" with various types of devices including a transmission electron microscope. The method involves providing a condenser lens having a back-focal plane (BFP) and image plane (IP). The data gathering involves placing different phase filters at the BFP and recording spatial intensity value for individual pixels of the image at the IP. The data is used to calculate "synthetic wave front images" by use of a computer program. The only similarity between the Applicants' phase contrast TEM and the Gerchberg method is use of a phase plate in a transmission electron microscope.

Whereas Gerchberg places a phase plate or phase filter at the BFP, Applicants do not. As explained in Applicants' specification, the back focal plane of an object lens of a TEM is not easily accessible for the placement of a phase plate. Moreover, it is especially difficult to locate a phase plate at the BFP and to provide deflection means for aligning the electron beam precisely on the phase plate.

The examiner states:

> 7. Gerchberg teaches the use of a series of lenses for imaging the back focal plane unto one another (col. 8, lines 44-56; col. 9, lines 9-21). That is, each lens in a series focuses the back-focal plane according to its phase distribution unto next lens in series to result in reconstructed object plane.
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> 9. Furthermore, Gerchberg teaches positioning a series of 6 different lenses successively in the BFP (220) (col. 8, lines 46-49; col. 9, lines 11-15; col. 9, lines 24-30).

The examiner misinterprets the reference. The reference does not expressly or implicitly suggest that one lens is used to focus the back-focal plane of another lens. Throughout the reference, the patentee describes placing phase filters into the BFP of the converging lens. The BFP being a plane, only one filter can be placed to align with and overlap the BFP. The reference states "a series of 6 different dioptric lenses 230 (FIG. 2) [are] placed successively in the BFP 220." (Col. 8, lines 46-49). This clearly means that one at a time the six lenses are successively placed at the BFP 220. It does not mean lenses are added spatially one after the other. This would require movement of the image plane with each added lens in the interpretation proposed by the examiner. Nothing in the reference suggests the movement of the image plane.

The examiner states:

> 8. In addition, Gerchberg teaches maintaining conjugate planes by the use of said lenses (col. 4, line 52 – col. 5, line 9).

The relationship between the BFP and IP of the condensing lens of Gerchberg is not "conjugate" in the sense that this term is used in the Applicants' specification and claims. Gerchberg uses the words "conjugate planes" in relation to the Fourier transform (Col. 5, lines 4-9). In a transmission electron microscope, if a specimen is placed at the specimen plane, the first diffraction pattern of the specimen is formed at the BFP and the image is formed at the IP. Thus, Gerchberg says that the diffraction and image planes are

conjugate in relation to a Fourier transform. As used in the Applicants' specification, the positional relations are conjugate between an object plane and an image plane. The positional relations of the object plane are converted into the equivalent positional relations in the image plane with respect to distance from the axis and tilt relative to the beam axis. This is carefully explained in the Applicants' specification at paragraphs [0019] to [0023] with reference to Figs. 3 and 4.

The examiner states:

> 10. Gerchberg does not explicitly teach said phase plate located beyond the back-focal plane of the objective lens; however, the teachings of placing a series of lenses (or phase plate) in the back focal plane would obviously assume that at least one of said lenses (or phase plates) in the back focal plane would obviously assume that at least one of said lenses (or phase plates) of the series will be placed just beyond the back focal plane.

The problem with this argument of the examiner is that Gerchberg does not teach a spatial series of lenses in or beyond the back-focal plane. Rather, he teaches sequentially inserting one lens at a time into the back-focal plane.

The examiner states:

> 11. In addition, Hasegawa et al. teaches the ability to place a phase plate in any location with an electron optical apparatus (col. 7, lines 13 – 37).
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> 12. It would have been obvious to ordinary artisan at the time this invention was made to modify Gerchberg to include in a series of lenses in the back focal plane a phase filter/plate since Gerchberg teaches said lenses and said phase plate are interchangeable (col. 5, lines 64 – col. 6 lines 5).

Although Gerchberg's 220 (BFP: back-focal plane of the camera lens 210) roughly corresponds to Applicants' 3 (back-focal plane of the objective lens 2) and Gerchberg's 230 (phase filter or dioptric lenses) corresponds to Applicants' 7 (phase plate),

the Examiner misunderstands that Gerchberg's 230 (phase filter of dioptric lenses) corresponds to Applicants' 4 and 5 (phase lenses). Because Gerchberg's 230 (phase filter or dioptric lenses) and Applicants' 7 (phase plate) are inserted in order to have optical effects. On the other hand, Applicants' 4 and 5 (phase lenses) are inserted into an optical system, not to influence the system "optically" except mechanical length. Because they keep the position and tilt of the beam at their entrance (back-focal plane 3 of the objective lens 2) and their exit (phase plate 7). Such lens system may be called a transfer lens system. On the other hand, Gerchberg's 230 (phase filter or dioptric lenses) influences the camera optics. (See Col. 5, line 64 to Col. 6, line 5.) Gerchberg does not teach Applicants' 4 and 5 (phase lenses).

Gerchberg does not teach "lenses for imaging the back-focal plane of the objective lens onto said phase plate such that position and tilt of the electron beam relative to an optical axis on said back-focal plane of the objective lens and on said phase plate are made conjugate" between the back-focal plane of the objective lens and the phase plate.

In view of the foregoing amendments and remarks, it is urged this case is now in condition for allowance.

Respectfully submitted,

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